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CLAIMS

1. A method of transforming between one or more point type sources and a line source in a transmission line structure, **characterized in that** the method comprises inserting a transmission line path controller between a first parallel-plate waveguide section and a second parallel-plate waveguide section, the transmission line path controller comprising a curved side to which one end of each waveguide is coupled, the transmission line path controller further comprising a waveguide slot, one side of which is a part of the curved side, the waveguide slot further coupling the waveguide ends that are coupled to the transmission line path controller, the method further comprising adjusting the curved side to get a desired path length between each different wave path of the one or more point sources and corresponding location of the line source.

2. A transmission line structure comprising a first parallel-plate waveguide section and at least one first electromagnetic wave port of substantially point character at a first end of the first waveguide, the first waveguide propagating an electromagnetic wave entered at the at least one first port of the first end of the first waveguide towards a second end of the first waveguide in a first principal propagation direction, the structure further comprising a second parallel plate waveguide section and a second electromagnetic wave port of a predetermined line character at a first end of the second waveguide, the second waveguide propagating in a second principal direction between a second end of the second waveguide and the second port of the first end of the second waveguide an electromagnetic wave which is entered at the at least one first port, **characterized in that** the structure comprises a transmission line path controller which controls a propagation path length of an electromagnetic wave passing through it in relation to where the

electromagnetic wave passes through the path controller, a first part of the path controller further changes the first principal propagation direction to a controller principal propagation direction for an electromagnetic wave entering the at least one first port, the first part of the path controller being coupled to the second end of the first waveguide and comprising a first slot in a first slot plane, the first slot having at least two curved sides.

3. The transmission line structure according to claim 2, **characterized in that** the first slot plane is parallel to the plates of the first waveguide.

4. The transmission line structure according to claim 2, **characterized in that** the first slot plane is symmetrically oriented in between the first principal propagation direction and the controller principal propagation direction.

5. The transmission line structure according to any one of claims 2 to 4, **characterized in that** the first principal propagation direction and the controller principal propagation direction are parallel.

6. The transmission line structure according to any one of claims 2 to 4, **characterized in that** the first principal propagation direction and the controller principal propagation direction forms an angle between 0° and 180°.

7. The transmission line structure according to any one of claims 2 to 6, **characterized in that** a side of the first slot furthest away from the at least one first port, is curved in the first slot plane, forming a first curved side of the first part of the path controller.

8. The transmission line structure according to claim 7, **characterized in that** the at least one other curved side of the first slot is a side opposite the first curved side and is curved in a similar manner, the first slot thus forming a substantially uniformly formed waveguide slot.

9. The transmission line structure according to claim 7 or 8, **characterized in that** the first curved side of the first part of the path controller extends into the first waveguide and forms at least in part an end opposite to the first port end of the first waveguide.

10. The transmission line structure according to any one of claims 7 to 9, **characterized in that** the first curved side of the first part of the path controller is curved along a first curved line in the first slot plane, and in planes parallel to the first slot plane along the first curved line in these parallel planes, to the extension of the first curved side.

11. The transmission line structure according to claim 10, **characterized in that** the first curved lines, in the parallel planes, are aligned along a straight line parallel to a normal to the first slot plane.

12. The transmission line structure according to claim 10, **characterized in that** the first curved lines in the parallel planes are aligned along a bent line.

13. The transmission line structure according to any one of claims 7 to 9, **characterized in that** the first curved side of the first part of the path controller is curved along a first curved line in the first slot plane, and in planes at an angle to the first slot plane along further curved lines in these planes to the extension of the first curved side.

14. The transmission line structure according to any one of claims 10 to 13, **characterized in that** the first curved line is parabolic.

15. The transmission line structure according to any one of claims 10 to 13, **characterized in that** the first curved line is piecewise parabolic along the first curved side.

16. The transmission line structure according to any one of claims 7 to 15, **characterized in that** the first curved side is symmetrical in relation to a plane defined by the first principal propagation direction and the controller principal propagation direction.

17. The transmission line structure according to any one of claims 2 to 16, **characterized in that** the first waveguide from the at least one first port flares out towards the first part of the path controller between the parallel plates.

18. The transmission line structure according to claim 17, **characterized in that** the transmission line path controller controls a propagation path length between the at least one first port to each point in the second port in a predetermined controlled manner such that a predetermined line source is formed in the second port.

19. The transmission line structure according to claim 18, **characterized in that** the transmission line path controller controls the propagation path length such that the propagation path length is substantially equal, independent of an electromagnetic wave propagation direction in the flared first waveguide.

20. The transmission line structure according to any one of claims 2 to 19, **characterized in that** the transmission line structure comprises more than one first port.

21. The transmission line structure according to any one of claims 2 to 20, **characterized in that** the at least one first port has an asymmetrical feed relationship with the first waveguide.

22. The transmission line structure according to any one of claims 2 to 20, **characterized in that** the at least one first port has a symmetrical feed relationship with the first waveguide.

23. The transmission line structure according to any one of claims 2 to 22, **characterized in that** the waveguides of the transmission line structure are aligned such that the first principal propagation direction, the second principal propagation direction and the controller principal propagation direction, form a plane which is perpendicular with the plates of the waveguides.

24. The transmission line structure according to any one of claims 2 to 22, **characterized in that** the first waveguide and the second waveguide are aligned in relation to each other such that a projection of the first principal propagation direction and a projection of the second principal propagation direction onto the slot plane along the plane's normal, form an angle with each other separate from zero on the plane.

25. The transmission line structure according to any one of claims 2 to 24, **characterized in that** the first part of the path controller is also coupled to the second end of the second waveguide and in that the controller principal propagation direction is the same as the second principal propagation direction.

26. The transmission line structure according to claim 25, **characterized in that** the first curved side of the first part of the path controller extends into the second waveguide and forms at least in part an end opposite the second port end of the second waveguide.

27. The transmission line structure according to claim 25 or 26, **characterized in that** the parallel plates of the first waveguide are parallel with the parallel plates of the second waveguide.

28. The transmission line structure according to claim 25 or 26, **characterized in that** the parallel plates of the first waveguide form an angle with the parallel plates of the second waveguide which is different from zero.

29. The transmission line structure according to any one of claims 2 to 24, **characterized in that** the transmission line structure comprises a third parallel-plate waveguide section and in that the transmission line path controller comprises a second part comprising a second slot in a second slot plane, and in that the first part of the path controller further being coupled to a first end of the third waveguide, a second end of the third waveguide being coupled to the second part of the path controller, and in that the second part of the path controller being coupled to the second end of the second waveguide, the controller principal propagation direction for an electromagnetic wave entering the at least one first port is in a direction from the first end of the third waveguide towards the second end of the third waveguide.

30. The transmission line structure according to claim 29, **characterized in that** the second slot plane is parallel to the plates of the third waveguide.

31. The transmission line structure according to claim 29, **characterized in that** the second slot plane is symmetrically oriented between the parallel plates of the second and third waveguides.

32. The transmission line structure according to any one of claims 29 to 31, **characterized in that** the first waveguide and the third waveguide are aligned in relation to each other such that a projection of the first principal propagation direction and a projection of the controller principal propagation direction onto a plane parallel to the plates of the first parallel-plate waveguide along the plane's normal, form an angle with each other separate from zero on the plane.

33. The transmission line structure according to any one of claims 29 to 32, **characterized in that** the parallel plates of the first waveguide are parallel with the parallel plates of the second waveguide.

34. The transmission line structure according to claim 33, **characterized in that** the parallel plates of the first waveguide form an angle with the parallel plates of the third waveguide which is different from zero.

35. The transmission line structure according to claim 33, **characterized in that** the parallel plates of the first waveguide are parallel with the parallel plates of the third waveguide.

36. The transmission line structure according to any one of claims 29 to 32, **characterized in that** the parallel plates of the first waveguide form an angle with the parallel plates of the second waveguide which is different from zero.

37. The transmission line structure according to claim 36, **characterized in that** the parallel plates of the first waveguide form an angle with the parallel plates of the third waveguide which is different from zero.

38. The transmission line structure according to claim 36, **characterized in that** the parallel plates of the first waveguide are parallel with the parallel plates of the third waveguide.

39. The transmission line structure according to claim 36 or 37, **characterized in that** the parallel plates of the second waveguide are parallel with the parallel plates of the third waveguide.

40. The transmission line structure according to any one of claims 29 to 39, **characterized in that** a side of the second slot furthest away from the second port, is curved in the second slot plane, forming a second curved side of the second part of the path controller.

41. The transmission line structure according to claim 40, **characterized in that** the at least one other curved side of the second slot is a side opposite

the second curved side and is curved in a similar manner, the second slot thus forming a substantially uniformly formed waveguide slot.

42. The transmission line structure according to claim 40 or 41, **characterized in that** the second curved side of the second part of the path controller extends into the second waveguide and forming at least in part an end opposite the second port end of the second waveguide.

43. The transmission line structure according to any one of claims 40 to 42, **characterized in that** the second curved side of the second part of the path controller is curved along a second curved line in the second slot plane, and in planes parallel to the second slot plane along the second curved line in these parallel planes to the extension of the second curved side.

44. The transmission line structure according to claim 43, **characterized in that** the second curved lines in the parallel planes are aligned along a straight line parallel to a normal to the second slot plane.

45. The transmission line structure according to claim 43, **characterized in that** the second curved lines in the parallel planes are aligned along a bent line.

46. The transmission line structure according to any one of claims 40 to 42, **characterized in that** the second curved side of the second part of the path controller is curved along a second curved line in the second slot plane, and in planes at an angle to the second slot plane along further curved lines in these planes to the extension of the second curved side.

47. The transmission line structure according to any one of claims 43 to 46, **characterized in that** the second curved line is parabolic.

48. The transmission line structure according to any one of claims 40 to 42, **characterized in that** the first curved side and the second curved side are formed such that the path controller forms a Cassegrain structure.

49. The transmission line structure according to any one of claims 40 to 42, **characterized in that** the first curved side and the second curved side are formed such that the path controller forms a Gregorian structure.

50. The transmission line structure according to any one of claims 2 to 49, **characterized in that** each coupling between a path controller part and a waveguide comprises appropriate matchings.

51. The transmission line structure according to any one of claims 2 to 50, **characterized in that** the transmission line structure is of an H-plane type.

52. The transmission line structure according to any one of claims 2 to 50, **characterized in that** the transmission line structure is of an E-plane type.

53. An antenna, **characterized in that** the antenna comprises a transmission line structure according to any one of claims 2 to 52.